

WHAT IS CLAIMED IS:

1. A method of treating HPV infection comprising administering an effective amount of a nucleic acid molecule to a patient in need thereof wherein said nucleic acid molecule inhibits expression associated with HPV replication.
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2. The method of claim 1, wherein said HPV is HPV11, HPV16, HPV18, HPV31, HPV33, HPV35, HPV39, HPV45, HPV52, or HPV58.
- 10 3. The method of claim 1, wherein said nucleic acid molecule is complementary to a nucleic acid sequence of said HPV.
4. The method of claim 1, wherein said nucleic acid molecule is administered topically.
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5. The method of claim 4, wherein said nucleic acid molecule is administered topically to a portion of the genital organ of said patient.
6. The method of claim 4, wherein said nucleic acid molecule is administered topically to cervical tissue of said patient.
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7. The method of claim 1, wherein said nucleic acid molecule is an antisense oligonucleotide or an siRNA molecule.
- 25 8. The method of claim 1, wherein said nucleic acid molecule is a ribozyme or DNAzyme.
9. The method of claim 1, wherein said nucleic acid molecule is administered together with a keratolytic agent, wherein said keratolytic agent is present in an amount effective to enhance the penetration of said nucleic acid molecule.
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10. The method of claim 9, wherein said keratolytic agent is salicylic acid or one or more alpha hydroxy acids.

11. The method of claim 1, wherein said patient suffers from cervical intraepithelial
5 dysplasia (CIN).

12. The method of claim 11, wherein said CIN is CIN I or mild dysplasia.

13. The method of claim 11, wherein said CIN is CIN II or moderate to marked
10 dysplasia.

14. The method of claim 11, wherein said CIN is CIN III or severe dysplasia to carcinoma-in-situ.

15 15. The method of claim 14, wherein said carcinoma-in-situ is localized to the intraepithelial tissue or the superficial layer of the cervix.

16. The method of claim 1, wherein said nucleic acid molecule is identified using a library selection technique.

20 17. The method of claim 16, wherein said library selection technique is an antisense oligonucleotide library selection technique.

18. The method of claim 16, wherein said library selection technique is a ribozyme
25 library selection technique.

19. The method of claim 16, wherein said library selection technique is a DNAzyme library selection technique.

30 20. A method for treating a mammal having cells infected with HPV, said method comprising administering a nucleic acid molecule to said mammal under conditions

wherein the number of said cells infected with said HPV is reduced, wherein said nucleic acid molecule comprises a sequence complementary to a nucleotide sequence of said HPV.

5 21. The method of claim 20, wherein said mammal is a non-human, immunodeficient mammal, and wherein said cells are human cells.

22. The method of claim 20, wherein said mammal is a nude or SCID mouse.

10 23. The method of claim 20, wherein said mammal is a human.

24. The method of claim 20, wherein said cell is a skin cell or epithelial cell.

15 25. The method of claim 20, wherein said HPV is HPV11, HPV16, HPV18, HPV31, HPV33, HPV35, HPV39, HPV45, HPV52, or HPV58.

26. The method of claim 20, wherein said nucleic acid molecule is administered topically to said mammal.

20 27. The method of claim 26, wherein said nucleic acid molecule is administered topically to a portion of the genital organ of said mammal.

28. The method of claim 26, wherein said nucleic acid molecule is administered topically to cervical tissue of said mammal.

25 29. The method of claim 20, wherein said nucleic acid molecule is an antisense oligonucleotide or an siRNA molecule.

30 30. The method of claim 20, wherein said nucleic acid molecule is a ribozyme or DNAzyme.

31. The method of claim 20, wherein the number of said cells infected with said HPV is reduced by at least 25 percent.

32. The method of claim 20, wherein the number of said cells infected with said HPV
5 is reduced by at least 50 percent.

33. The method of claim 20, wherein the number of said cells infected with said HPV is reduced by at least 75 percent.

10 34. The method of claim 20, wherein said nucleotide sequence comprises a target site identified using a library selection technique.

35. The method of claim 34, wherein said library selection technique is an antisense oligonucleotide library selection technique.

15 36. The method of claim 34, wherein said library selection technique is a ribozyme library selection technique.

20 37. The method of claim 34, wherein said library selection technique is a DNAzyme library selection technique.

38. The method of claim 20, wherein said cells infected with said HPV contain non-integrated HPV nucleic acid.

25 39. The method of claim 20, wherein said cells infected with said HPV contain replicating HPV.

40. An isolated catalytic nucleic acid comprising a catalytic core sequence, a 5' recognition sequence, and a 3' recognition sequence, wherein said isolated catalytic
30 nucleic acid cleaves a target mRNA sequence selected from the group consisting of the sequences set forth in SEQ ID NOS:4-48.

41. The isolated catalytic nucleic acid of claim 40, wherein said isolated catalytic nucleic acid is a ribozyme.

5 42. The isolated catalytic nucleic acid of claim 41, wherein said catalytic core sequence comprises the sequence set forth in SEQ ID NO:51.

43. The isolated catalytic nucleic acid of claim 40, wherein said isolated catalytic nucleic acid is a DNAzyme.

10 44. The isolated catalytic nucleic acid of claim 43, wherein said catalytic core sequence comprises the sequence set forth in SEQ ID NO:68.

15 45. An isolated, single-stranded nucleic acid molecule consisting of between five and 40 nucleotides, wherein said nucleic acid molecule comprises a sequence complementary to at least five consecutive nucleotides of a sequence selected from the group consisting of SEQ ID NOs:4-48.

20 46. The nucleic acid molecule of claim 45, wherein said nucleic acid molecule is DNA.

47. An isolated, double-stranded RNA molecule, wherein one strand of said RNA molecule comprises a nucleic acid sequence complementary to at least five consecutive nucleotides of a sequence selected from the group consisting of SEQ ID NOs:4-48.

25 48. The RNA molecule of claim 47, wherein said RNA molecule consists of between five and 40 nucleotides.

30 49. The RNA molecule of claim 47, wherein said RNA molecule consists of between 18 and 25 nucleotides.

50. A method for making a library of single-stranded DNAzymes, said method comprising:

(a) amplifying nucleic acid in an amplification reaction to form an amplification reaction product, wherein said amplification reaction comprises template nucleic acid and a primer containing at least one ribose nucleotide, wherein one strand of said template nucleic acid comprises said library of single-stranded DNAzymes, and wherein said amplification reaction product comprises double-stranded nucleic acid with a strand comprising said at least one ribose nucleotide,

5 (b) contacting said amplification reaction product with a base hydrolysis agent under conditions wherein said strand comprising said at least one ribose nucleotide becomes shorter than the other strand of said double-stranded nucleic acid, and

10 (c) obtaining the strand from step (b) comprising said library of single-stranded DNAzymes based on size.

15 51. The method of claim 50, wherein said amplification reaction further comprises a primer lacking ribose nucleotides.

52. The method of claim 50, wherein said amplification reaction comprises two primers comprising at least one ribose nucleotide.

20 53. The method of claim 50, wherein the shorter strand of said double-stranded nucleic acid of step (b) comprises said library of single-stranded DNAzymes.

25 54. The method of claim 50, wherein the longer strand of said double-stranded nucleic acid of step (b) comprises said library of single-stranded DNAzymes.

55. The method of claim 50, wherein said base hydrolysis agent is sodium hydroxide.

30 56. A composition comprising a nucleic acid molecule and a keratolytic agent, wherein said nucleic acid molecule comprises a sequence complementary to a nucleic acid sequence present in an HPV, and wherein said keratolytic agent is present in an

amount effective to enhance penetration of said nucleic acid molecule.

57. The composition of claim 56, wherein said nucleic acid molecule is an antisense oligonucleotide or an siRNA molecule.

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58. The composition of claim 56, wherein said nucleic acid molecule is a ribozyme or DNAzyme.

59. The composition of claim 56, wherein said keratolytic agent is salicylic acid.

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60. A nucleic acid molecule comprising $(N)_{n1}$ followed by $(oxygen-carbon-carbon)_{n2}$ followed by $(N)_{n3}$, wherein N is a nucleotide, and wherein said n1, n2, and n3 are integers greater than 0.

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61. The nucleic acid molecule of claim 60, wherein said n1 is between 10 and 20.

62. The nucleic acid molecule of claim 60, wherein said n2 is between 3 and 10.

63. The nucleic acid molecule of claim 60, wherein said n3 is between 10 and 20.

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64. The nucleic acid molecule of claim 60, wherein said $(N)_{n1}$ is a DNA sequence of 17 consecutive adenosines.

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65. The nucleic acid molecule of claim 60, wherein said $(N)_{n3}$ is a 5'-TGTAAAACGACGCCAG-3' sequence.

66. The nucleic acid molecule of claim 60, wherein said nucleic acid molecule comprises a phosphate group between said $(oxygen-carbon-carbon)_{n2}$ and said $(N)_{n3}$.

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67. A method for making a library of single-stranded DNAzymes, said method comprising:

(a) amplifying nucleic acid in an amplification reaction to form an amplification reaction product, wherein said amplification reaction comprises template nucleic acid and a primer comprising an $(\text{oxygen-carbon-carbon})_n$ backbone unit, wherein n is an integer greater than 1, wherein one strand of said template nucleic acid comprises
5 said library of single-stranded DNAzymes, and wherein said amplification reaction product comprises double-stranded nucleic acid wherein the strand extending from said primer is shorter than the other strand of said double-stranded nucleic acid, and

(b) obtaining the strand from step (a) comprising said library of single-stranded DNAzymes based on size.

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